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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/996,423	11/28/2001	John Whitman	4294.3US (98-1208.3)	2810

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EXAMINER	
PHAM, THANH V	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/996,423	WHITMAN ET AL.	
	Examiner	Art Unit	
	Thanh V. Pham	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7-11,14-16 and 20-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 7-11, 14-16 and 20-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 1, 7 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "gradually" in claims 1, 7 and 14 is a relative term which renders the claim indefinite. The term "gradually" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

It is understood from the most detail descriptive paragraph [0041] that the first speed is 1,000 rpm in about one second to about five seconds, the second speed is 100 rpm for a period of about five seconds to about ten seconds, the third speed is at least 1,500 rpm without stating a duration and the fourth speed is about 50 rpm for a duration of about 19 to about 50 seconds. Paragraph [0041] or the whole specification *does **not** provide the **acceleration** from the second speed to the third speed*. Therefore, it is not clear at what rate the "gradually increasing" to a third speed is recited in claims 1, 7 and 14. See Indefinite Limitations must be Considered, MPEP 2143.02.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-4 are rejected under 35 U.S.C. 102(a) as being anticipated by Yoshihara U.S. Patent No. 6,117,486.

The Yoshihara reference discloses a coating method (col. 2, line 54 to col. 3, line 9, e.g.) comprising:

applying a material to a substrate;

spinning said substrate and said material at the first speed;

decelerating to the second speed; then

accelerating to a third speed.

The rate of increase of the spinning speed disclosed by Yoshihara is encompassed by "gradually increasing" with respected to any faster than disclosed rate of acceleration.

With the same procedure, it would have been inherent in the rotation speeds that the material when spread over the surface of a wafer would fill the recesses at a first speed and would set at a second speed.

Furthermore, applicant has never traversed Yoshihara's steps of applying a material to a substrate and spinning said substrate and said material at the first speed in the rejection.

Therefore this same rejection under 35 USC 102(a) in the previous Office Actions mailed 10/21/03 and 10/26/04 is maintained.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-4, 7-11, 14-16 and 20-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshihara U.S. Patent No. 6,117,486 in combination with Rodrigues U.S. Patent No. 5,405,813 and Wolf, Silicon Processing for the VLSI Era, vol. 1.

The Yoshihara reference discloses a coating method as described above.

The Rodrigues reference discloses a spin coating method comprising:

applying a material to a substrate;

spinning said substrate and said material at the first speed (abstract);

decelerating to the second speed (col. 5, line 34 and col. 6, line 16); then

accelerating to a third speed (col. 6, line 16 and line 50).

The substrate is accelerated to a fourth speed to further set the material (col. 6, line 53).

Rodrigues teaches all steps of the instant invention but lacks a clear teaching on photoresist application, filling recesses at first speed and letting the material set at second speed and the duration of the second speed.

Rodrigues reference's related prior art (the Background and col. 4, lines 6-13) also teaches spinning the substrate and the material at a first speed; this teaching corresponds to which called *"static dispense"* by Wolf, page 431 (provided by the applicant and addressed in the previous Office actions).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Wolf and Rodrigues or Yoshihara to enable the initial step of Rodrigues or Yoshihara to be performed according to the teachings of Wolf because one of ordinary skill in the art would have been motivated to look to alternative suitable methods of performing the

disclosed initial step of Rodrigues or Yoshihara and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07. In other words, to apply Wolf's "static dispense" step into Rodrigues' and/or Yoshihara's method to have the photoresist on the substrate before said substrate and said material being spun at a first speed would have been obvious to one of ordinary skill in the art at the time the invention was made as the photoresist application on the substrate before said substrate and said material being spun would be selected in order to "provides more uniform coating" (Wolf's last line of the third paragraph on page 431) in spreading the resist material over the substrate with different line widths in accordance with the teaching of Yoshihara and/or Rodrigues.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a duration for each rotating speed of Yoshihara at every speed in the process of Rodrigues to fill and to set the material into the recess of different line widths as each speed with a duration of time would be performed in order to improve the controlling of the thickness of the coated film in the process of photoresist dispense method as taught by Rodrigues. Alternatively, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the fourth speed of Rodrigues into the process of Yoshihara as the more speed of rotation would be selected in order to further set the material in the recess in accordance with the dispensing method as taught by Yoshihara.

It would have been inherently included in the rotation speeds that the material when spread over the surface of a wafer would fill the recesses at a first speed and would set at a second speed; otherwise, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the appropriate speeds for the two rotations to have the

material fill the recess and to set into the process of Yoshihara (col. 1, line 63 to col. 2, line 1) because such rotation speeds would have been selected in accordance within the spin coating art in order to have a desired coating thickness as taught.

As admitted (the instant specification's page 13, lines 7-8), the edge bead removal technique is known; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the fifth speed to remove the solvent from said material because such an extra step would have been applied as one of the method to rinse off the solvent use in the bead removal.

Response to Arguments

6. Applicant's arguments filed 01/31/2005 have been fully considered but they are not persuasive.

7. Applicant requests a reversal of the rejection of claims 1, 7 and 14 under 35 USC 112, second paragraph based on MPEP 2173.05(b) with the analysis from pages 2-4 in the argument. The examiner does not agree by the following reasons.

Firstly, in accordance to the above section of MPEP and applicant's statement "the term 'gradually' is a relative term, which is acceptable if one of ordinary skill in the art would readily understand its meaning in light of the specification", the examiner tries to look in the instant specification but finds no factually supported objective evidence for this relative term. Paragraphs [012], [0014], [0019] and [0040], after the term "gradually increased", add "or ramped up" as an explanation without giving any further value(s) or number of rotation per unit of time. The most detailed paragraph

[0041] By way of example, when ARCH 895 photoresist is used as the mask material, the substrate bearing stacked capacitor structure 10 is spun at a first speed of about 1,000 rpm until a substantially homogeneous layer is formed (e.g., about one second to about five seconds). The spinning rate is then decreased to about 100 rpm for a period of about five seconds to about ten seconds to allow the photoresist within containers 14 to begin setting. The rate at which stacked capacitor structure 10 is spun is then gradually increased to a third speed of at least about 1,500 rpm until the photoresist covering surface 12 reaches a desired, reduced thickness or until the photoresist is substantially removed from surface 12. The spin rate is then decreased again, this time to about 50 rpm, for a duration of about 19 to about 50 seconds to permit additional setting, or casting, of the photoresist.

[0041] clearly does not disclose any further regular or continuous value(s) or magnitude of acceleration/deceleration per unit of time or, at least, a time frame from one speed to another for the claimed "gradually increasing" term. One of ordinary skill in the art would not mistake the speed and the acceleration. One of ordinary skill in the art also would understand the meaning of a relative term with respect to something and not just state a value without concerning to or with respect to some other value as a base of judgment.

Secondly, the rejection under 35 USC 112, second paragraph is based on the "gradually **in**creasing a rate of the spinning to a substantially constant third speed" in claim 1, "gradually **in**creasing a rate of spinning of the substrate to a third speed" in claims 7 and 14, not the gradually **de**creasing from the first speed to the second speed. Therefore, the argument based on the decreasing from the first to the second speeds *as negative acceleration* is irrelevant to the rejection *when it is clearly discussed the increasing or decreasing*.

Finally, in accordance to the second part of that extracting section of MPEP, it is agreed that the term "gradual" is defined as "advancing or progressing by regular or continuous degrees" as in the American Heritage College Dictionary; therefore, the regular or

continuous 20,000 rpm per second (provided by the applicant) of Wolf has been suggested as an adequate compromise spin-ramp **with respect to** various variable parameters **or** Yoshihara's acceleration/deceleration (related tables in cols. 9 and 10) of 10,000/30,000 rpm per second wherein a number of rpm**/sec** is provided as a regular or continuous degrees of acceleration/deceleration from one speed to another speed. Gradually or not gradually, both Wolf and Yoshihara provide a degree of rpm **over a time period** for their acceleration/deceleration with respect to some values while the instant specification does not.

At least for the above reasons, the rejection under 35 USC 112, second paragraph is maintained as stated in the previous Office Action mailed 10/26/04 and repeated herewith.

8. In response to applicant's argument, in pages 4-6, on the validity of "gradually increasing" of Yoshihara in the rejection under 35 USC 102(a), and in accordance with applicant's statement "the term 'gradually' is a relative term" in applicant's argument, page 2, the last line, the examiner considers the rate of increase of the spinning speed disclosed by Yoshihara is encompassed by "gradually increasing" relative to any faster than disclosed rate of acceleration. Moreover, the acceleration of Yoshihara at 10,000rpm/sec can be considered 'gradually' relative to Yoshihara **de**celeration at 30,000 rpm/sec ("drastically reduced", col. 10, lines 10-11). Yoshihara does not consider 10,000 rpm/sec as "drastically" increase. The argument on the deceleration is again irrelevant as in the above.

9. With respect to claims 2-3, the inherency of filling the recesses by the material in the first speed and the material being set in the second speed that would be obtained by the same performed process steps. Yoshihara discloses the different characteristics of "low-viscosity material, compared to the conventionally-used resist film" in col. 1, lines 58-59

and continues that "it is also necessary to control the rotational speed of the semiconductor wafer to set the same at a speed which permits the resist solution to dry with such a timing that the concentric circular ripple of the resist solution reaches and passes the edge of the semiconductor wafer" (col. 1, line 63 to col. 2, line 1). It is not necessary for the reference to disclose that the process of the reference is performed to achieve the same goals as applicant or to obtain the same advantages recognized by applicant. It is sufficient that the process suggested by the reference alone or in combination with the remaining references is encompassed by the instant claims. The purpose of the Yoshihara reference does not have to be the same as the instant invention inasmuch as it provides the same procedure, MPEP 2131.05.

> Arguments that the alleged anticipatory prior art is nonanalogous art' or teaches away from the invention' or is not recognized as solving the problem solved by the claimed invention, [are] not germane' to a rejection under section 102." Twin Disc, Inc. v. United States, 231 USPQ 417, 424 (Cl. Ct. 1986) (quoting In re Self, 671 F.2d 1344, 213 USPQ 1, 7 (CCPA 1982)).

Furthermore, applicant has never traversed Yoshihara's steps of applying a material to a substrate and spinning said substrate and said material at the first speed in the rejection.

10. In response to applicant's arguments against the Rodrigues reference individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. The rejection is based on Rodrigues' teaching and Rodrigues' admitted prior art that related to Wolf's teaching. The rejection is not based on the teaching of Rodrigues alone but the combination of Rodrigues' steps with Wolf's teaching of "static dispense techniques are more desirable than dynamic dispense techniques" as recognized by the applicant (the Remark's page 7). Further, the test for obviousness is not

whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this instant, Rodrigues teaches its own invention and invokes Wolf's teaching that can be used for the initial step in the process. The initially "static dispense techniques are more desirable than dynamic dispense techniques" and can be applied to improve the whole subsequent dynamic steps of both Yoshihara and Rodrigues. The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. The references relied on are in the same field of endeavor and are reasonably pertinent to the particular problem with which the applicant was concerned, therefore they are analogous and valid as a basis for rejection of the claimed invention.

11. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a

reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

12. In response to applicant's argument that "Wolf teaches away from any combination with teachings from either Yoshihara or Rodrigues", this argument is respectfully traversed because Wolf teaches this initial step nonetheless, and disclosed static dispense can be used to improve the dynamic dispense clearly.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V. Pham whose telephone number is 571-272-1866. The examiner can normally be reached on M-T (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVP
05/18/2005

George Pourson
Primary Examiner